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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/669,479	09/24/2003	Steven G. Goebel	GP-303584	3973

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CARY W. BROOKS
General Motors Corporation
Legal Staff, Mail Code 482-C23-B21
P.O. Box 300
Detroit, MI 48265-3000

EXAMINER

HODGE, ROBERT W

ART UNIT	PAPER NUMBER
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1795

MAIL DATE	DELIVERY MODE
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04/03/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/669,479

Applicant(s)

GOEBEL ET AL.

Examiner

ROBERT HODGE

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Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 January 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 13-27-29-32-35 and 41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 13-27-29-32-35 and 41 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 12/27/07 have been fully considered but they are not persuasive. The amendment to claim 13 raises issues of new matter, scope of enablement and indefiniteness that will be addressed below. Because of these issues as will be discussed in detail below the prior art rejections will be maintained.

Claim Rejections - 35 USC § 112

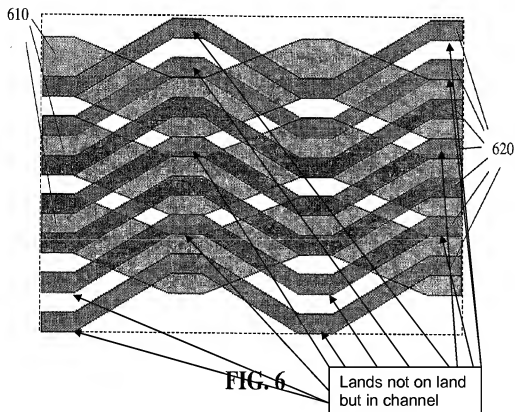
The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 13-27, 29-32, 35 and 41 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Applicants are reciting two different embodiments within claim 13. Applicants point the examiner to figure 4 for support of the amendment to claim 13 filed 1/14/08, previously applicants pointed the examiner to figure 6 for support of the alternating angles called wiggles. It is quite clear to the Examiner that figure 6 has support for the alternating angles and that figure 4 supports the amendment reciting that the first lands align with the second lands and do not align with the second channels. However there is no support for the combination of

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the two distinct embodiments disclosed by the figures. As can clearly be seen in figure 6, which is the only figure that shows the embodiment of alternating angles, there are in fact lands 620 that do not align with lands 610 as illustrated below:



As seen above there are at least 12 lands labeled as 620 that overlap in a channel region (channel region is defined by the white areas) not to mention all of the diagonal areas that overlap in a channel region. Therefore the recitation that the first lands do not align with the second channels is new matter.

Claims 13-27, 29-32, 35 and 41 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for providing first lands that align with second lands but do not align with second channels in one embodiment such

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as illustrated in figure 4, does not reasonably provide enablement for the combination of the embodiment from figure 4 with the embodiment of figure 6. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims. As was explained and illustrated above there are in fact lands in figure 6 that align with channels and therefore the combination of the embodiment from figure 4 with the embodiment from figure 6 as recited in claim 13 does not enable a skilled artisan to make the instantly claimed invention since the combination clearly cannot occur since the embodiments contradict each other.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 13-27, 29-32, 35 and 41 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 13 recites the limitation of alternating angles of the channels and lands as is illustrated in figure 6, the newly added limitation to claim 13 now recites that the first lands align with second lands and do not align with second channels and applicants direct the examiner to figure 4 for support. However it is unclear to the examiner how both figure 6 and figure 4 can support the instantly claimed invention when claim 6 clearly shows lands that align in the channels as is illustrated above. Therefore the distinct embodiments of figures 4 and 6 respectively contradict one another and claim

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13 as well as the claims that depend on claim 13 are indefinite for all of the reasons established above.

For at least the reasons established above in the rejections under 35 U.S.C. 112, first and second paragraphs as long as the prior art teaches channels and lands having alternating angles wherein at least some of the lands are in contact with each other it will read on the claims as recited.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 13-22, 31 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,037,023 hereinafter Grehier in view of U.S. Patent No. 6,544,681 hereinafter McLean.

As seen in figures 9 and 11 Grehier teaches an electrochemical cell comprising a membrane electrode assembly (15 and E_1 - E_5) defining anode and cathode sides that interposes respective flow field plates associated with them, wherein the flow field plates each have channels 14 that are substantially serpentine and are separated by lands and the lands are provided in a pattern of alternating angles and crests in a plane to both of said flow field plates, said pattern of lands being orientated relative to each other across the membrane electrode assembly (15 and E_1 - E_5), such that the lands crisscross along said alternating angles and overlap on said crests (see also column 2, lines 25-27 and column 3, line 39 – column 4, line 11).

Grehier does not teach that a pitch defined by one flow field plate is greater than a pitch of the other, or any other details outlined in the above listed dependent claims with regards to the pitch and cross-sectional dimensions, or that the fuel cell is a proton exchange membrane fuel cell.

McLean teaches a proton exchange membrane (PEM) type fuel cell system comprising a membrane electrode assembly (MEA) defining anode and cathodes sides, having a first flow field plate for the cathode side defined by first channels and lands, a second flow field plate for the anode defined by second channels and lands with the MEA interposed between the first and second flow field plates, wherein the pitch of the first flow field plate is less than a pitch of the second flow field plate and said pitch defined by the second flow field plate is approximately twice as large as that defined by the first flow field plate, wherein a substantial number, majority and substantially all of the second lands have a cross sectional width wider than that of a substantial number, majority and substantially all of the first lands and this remains constant from the inlet manifold to the outlet manifold. McLean further teaches that the channels are either predominately straight or serpentine in orientation (abstract, figures 3, 4 and 8, column 1, line 14 – column 2, line 36, column 3, line 60 – column 4, line 57, column 6, line 50 – column 8, line 42). The Examiner notes that figure 3 is only one of many bipolar plates that are provided within the fuel cell stack and therefore since channels 34 are for Hydrogen and 36 are for Oxygen a MEA would be present on both sides of the plate and subsequent plates would be stacked respectively against the MEAs thereby providing multiple plates as required by the instant claims.

At the time of the invention it would have been obvious to one having ordinary skill in the art to optimize the pitches and cross-sections as well as providing a proton exchange membrane in Grehier as taught by McLean in order to provide a fuel cell that would be optimized by reducing the size of the flow field plate and reduce the amount of material required to manufacture the plate, thereby allowing for a more compact and lighter design, which is the intent of Grehier. It is also clear that Grehier is also concerned with optimizing the geometric configurations of the channels as outlined in column 3, lines 54 et seq. It would have also been obvious to one having ordinary skill in the art at the time the invention was made to optimize the field flow plates of Grehier as taught by McLean since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art, in the absence of unexpected results. In re Boesch, 617 E.2d 272, 205 USPQ 215 (CCPA 1980).

Claims 23-27, 29, 30, 32 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grehier in view of McLean as applied to claim 13 above, and further in view of U.S. Pre-Grant Publication No. 2002/004158 hereinafter Suzuki.

Grehier as modified by McLean does not teach the specific dimensions recited in the above listed claims, the specific land-to-land alignment across the membrane electrode assembly or that the fuel cell is provided in a vehicle.

Suzuki teaches a proton exchange membrane fuel cell for an automobile comprising membrane electrode assemblies which have two field flow plates having a plurality of channels wherein a substantial number, a majority and substantially all of the channel widths are approximately equal wherein the channels are designed to be varied

in shape and pattern, where the channels can be different sizes, and cross sectional areas that have the same specific dimensions as those claimed in the present application, as well as orienting lands in parallel planes at an angle from 0 to 90 degrees such that a land contact on both sides of the MEA is between 20% and 50% and the pitch of the channels can be varied (figures 3, 4 and 5 and paragraphs [0002], [0023]-[0026], [0056]-[0059], [0063], [0066]-[0070], [0078]-[0079] and [0084]). Suzuki also teaches many different formulae for optimizing all of the dimensions of the field flow plates as can be seen throughout the entire disclosure.

At the time of the invention it would have been obvious to one having ordinary skill in the art to further optimize the dimensions of the flow field plates as well as their land-to land alignment across the membrane electrode assembly of Grehier as modified by McLean as taught by Suzuki in order to provide a fuel cell that would be further optimized by reducing the size of the flow field plate and reduce the amount of material required to manufacture the plate, thereby allowing for a more compact and lighter design, which is the intent of Grehier. As well as providing a fuel cell in a vehicle in order to replace the internal combustion engine that would in turn provide a vehicle that operates using clean energy and reducing pollutants released to the atmosphere. It would have also been obvious to one having ordinary skill in the art at the time the invention was made to optimize the field flow plates of Grehier as modified by McLean as taught by Suzuki since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art, in the absence of unexpected results. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROBERT HODGE whose telephone number is (571)272-2097. The examiner can normally be reached on 8:00am - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Robert Hodge/
Examiner, Art Unit 1795